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Pirmasens. Presented by the Bavarian Government. China: Map of the Province of Kwang-tung, by an Italian Missionary; on 2 sheets. Presented by J. L. Southey, Esq., of Hong-kong. Map of the Arctic and Antarctic Regions. Projected and presented by Dr. A. Petermann. Map of Abyssinia, showing the progress of the British Army. Presented by Dr. A. Petermann.

The following Papers were read:—

1. *Geographical Results of the Abyssinian Expedition.* No. 1.
2. *Geographical Results of the Abyssinian Expedition.* No. 2.

By C. R. MARKHAM, Esq., Secretary R.G.S.

IN these papers Mr. Markham communicated to the Society the Geographical results of the Abyssinian Expedition down to January 22nd, 1868. Commencing with a description of the shores of Annesley Bay, he stated that the ancient Greek city of Adulis, the emporium of Greek trade in the time of the Ptolemies, formerly stood close to the shore; but the ruins were now at a distance of four miles. On a few mounds, concealed by salicornia-bushes, there have been found broken pieces of fluted columns, capitals, and other fragments. But a great wealth of antiquarian treasure may be concealed under the mounds; and Dr. Lumsdaine, after making a very slight excavation, found the bronze balance and chain of a pair of scales,—an appropriate first discovery in the ruins of a great commercial city. The Shohos, who inhabit the plain, are a black race, with rather woolly hair and small-boned; but with regular, and, in some instances, even handsome features. They wear a cotton cloth round the middle, and a cloak of the same material, the head and feet bare, and are always armed with a curved sword, worn on the right side, spear, club, and leathern shield. They have cattle of a very diminutive breed, asses, goats, and sheep. Their mode of sepulture is peculiar; the graves are marked by oblong heaps of stones, with an upright slab at each end. A hole is dug about 6 feet deep, at the bottom of which a small cave is excavated for the reception of the body. The tomb is then closed with stones, and the hole leading to it is filled up. The reconnoitering party, under General Merewether, Colonel Phayre, and Colonel Wilkins, made extensive explorations of the approaches to the Abyssinian highlands in the months of October, November and December. At the head of Annesley Bay an extinct volcano was observed, with a double crater 100 feet deep and 300 feet across; and scoria and pumice were seen scattered over the plain. Beyond Arafali extends a plain, where ostriches and antelopes were met with. Travelling

southwards, the River Ragolay was reached, 49 miles distant from the sea; and the northern limit of the great salt plain, east of the Abyssinian highlands, was traced. It was discovered that the eastern drainage of the whole of the Abyssinian plateau from Senafé to Atsbi, which are 70 miles apart, consisted of tributaries of the Ragolay. At the point reached the river was a perennial running stream, in spite of thirsty sand and scorching sun. Afterwards in flowing towards the sea it descends into a depression 193 feet below the sea-level, which was probably caused by some volcanic action, and its waters are finally dissipated by evaporation. Opportunities would be taken, during the march of the field force along the watershed from Senafé to Atsbi, of completing the examination of the tributaries of the Ragolay to the eastward; and possibly, if any of the ravines through which they flow afford tolerable roads, it may be deemed advisable to open another line of communication by the Ragolay to the sea at Howakil Bay. The author travelled up the Senafé Pass, with Sir Charles Staveley and his staff, between the 20th and 22nd of December. The road enters the pass immediately on leaving Komayli, and winds up the dry bed of the Nebha-guddy. In several places the alluvial deposit brought down by the torrent was from 10 to even 20 feet thick. The pass winds much and is narrow, while the gneiss-mountains rise up perpendicularly on either side. Near Sonakte the gneiss ceases, and a dark schistose metamorphic rock, with strata thrown up at angles of upwards of 70 degrees, takes its place, apparently overlying it. It was observable that, whenever there was running water, the strata were nearly horizontal, or but slightly tilted, while the waterless tracts were those in which the strata were tilted at great angles. Further on the scenery becomes very fine, the cliffs higher, with peaked mountains towering up behind them, and the vegetation richer and more varied. Very fine trees of the fig tribe, peepul, banyan, and sycamore-figs, grow in this part of the gorge, with the feathery tamarix, tamarinds, jujub-trees, and an undergrowth of mimosa, lobelia, and solanum. The author climbed to the top of a hill above Raraguddy, and obtained a splendid view. To the south and west extended the edge of the Abyssinian table-land; running in almost a straight line, with scarped sides of white sandstone. The mountain-ridges or spurs, between which the passes wind, appeared to run off from the table-land at right angles, but afterwards turning to the north and throwing up peaks here and there. Observations for altitude and for latitude were taken at all the principal halting-places. Mr. Markham stated that he had been in the Alps and Pyrenees, had walked or ridden up nearly every pass in the Western Ghauts of

India, from Bombay to Cape Comorin, and knew most of the passes in the Peruvian Andes; and could confidently affirm that in none of these ranges was there any natural opening so easily accessible as that from Komayli to the highlands of Abyssinia. On an examination of the area of drainage of the torrents which flow down these passes, Mr. Markham believed that the danger of floods in the rainy season was not so great as had been supposed. Advantage had since been taken of the delay at Senafé to explore a great part of the neighbourhood, a description of the natural features of which was given in the second paper. The table-land lay at a general altitude of 8000 feet above the sea, and was diversified by valleys, ridges of hills, and peaks; some of which—as Mount Sowayra, ascended by the author—proved to be 9100 feet in height. The geological formation is sandstone, resting unconformably on the same highly-tilted strata as visible in the pass. One of the most interesting points is the character of the vegetation as varying with the elevation; the plants and trees forming successive zones of differing character in ascending from the plains to the mountain-summits. On the summit and slopes of Mount Sowayra (9100 feet) the *flora* is of a thoroughly temperate and even English character. The only tree is the juniper, while the most common plants are lavender, wild thyme, dog-rose, violets, cowslips, and various *composite*. The sandstone plateaux have a similar *flora*, but on the lower slopes of the hills bounding the valleys it is enriched by many trees and shrubs of a warmer clime. Italian here mingles with English vegetation. In the lovely gorge of Baraka, on the western side of the Mai Mena Valley, masses of maiden-hair fern droop over the clear pools of water, and the undergrowth consists of a *Myrsine*, a large lobelia, and solanum. At this elevation a vegetation akin to that of the Bombay Ghauts commences. In the Hamas Gorge (5850 feet) there is nothing but acacias and mimosæ. The open valleys, as a rule, are bare of trees. The temperate flora extends over a zone from 9000 to 6000 feet, the sub-tropical from 6000 to 3000, and the dry tropical coast-vegetation from 3000 feet to the sea.

These papers will be printed entire in the Journal, vol. xxxviii.

The PRESIDENT, in expressing the thanks of the Society to Mr. Markham, said the descriptions which he had given of the successive zones of vegetation forcibly reminded him of some of the admirable generalisations of Humboldt. There was scarcely any point connected with the physical geography of the region which had escaped Mr. Markham's attention. He had also communicated some interesting observations on the geological structure of the country. The different altitudes of the table-lands and peaks had been observed and recorded, besides observations for latitude and compass variation. He had sin-

cere pleasure in testifying to Mr. Markham's zealous efforts in former years, in various parts of the world, to work out any problems in geography that engaged his attention. He had twice visited the Peruvian Andes, and had described large portions of that region; in his second journey having accomplished the remarkable work of conveying the cinchona-plant from Peru, and planting it in different parts of India. These services had obtained for Mr. Markham distinction wherever they were known; and he was proud to mention that at the Athenæum Club, where they were in the habit every year of electing nine men eminent in science, letters, and arts, Mr. Markham had the honour of being among the first three that were elected in this season. Seeing the Secretary of State for India present, he might add that, Sir Stafford Northcote had consented to part with Mr. Markham's services at the India Office, where he was most highly esteemed, in order that he might be appointed on his, the President's, recommendation, Geographer to the Abyssinian expedition.

Sir STAFFORD NORTHCOTE, M.P., said, shortly before Mr. Markham was called away he had been promoted to a post of considerable importance and difficulty in the Indian Office, with a view to special services; and he confessed it was not without considerable reluctance that the Council of India assented to his being taken away to engage in another sphere of labour. Mr. Markham had gained a great reputation, considering his years, for the services he had rendered to humanity, more especially with reference to the introduction of the cinchona-plant into India, for which he had received the *grande médaille d'or* at the recent Paris Exhibition. The paper to which they had been listening fully bore out his reputation. It was one consolation, under the melancholy necessity of this expedition, that it gave us the opportunity of promoting the objects of science, incidentally, and he believed that many useful results would be attained. He understood that the season had been an exceptional one in Abyssinia. It had been a season of peculiar drought; and there had, consequently, been great difficulty in obtaining water and forage. The country had also been afflicted with an unusual visitation of locusts, and a great deal of the barley and other crops, upon which the troops reckoned in their advance, had been destroyed. The necessity of having to send a much larger quantity of supplies from the sea-coast to Senafé had delayed the advance of our troops, and would necessarily add to the cost of the expedition. Still this circumstance had not been unattended with advantages; it had enabled us to impress upon some of the native chiefs and their representatives an idea of our skill and power, in being able to turn the sea into drinking-water, and to draw water from the earth by means of Mr. Norton's admirable American pump. The first attempt to penetrate the country was made by the Takoonda Pass, to the westward of Senafé, which is the one best known, but it was found a difficult pass on account of the scarcity of water. The system of ready payment which we adopted had gained the confidence of the natives, and abundant supplies were now pouring in from a considerable distance. The cry of the butter-women and the milk-women was to be heard in the camp; and the inhabitants were most friendly disposed towards us. Their good-will would prove most valuable to us in the advance of the expedition southward.

Dr. BEKE said, with reference to the ruins mentioned by Mr. Markham as having been discovered near Senafé, that Senafé was no doubt the representative of an ancient Greek town, which existed in its neighbourhood, just as Zulla was the representative of the ancient Adulis, although it was some distance on the opposite side of the Haddas. He could not help thinking that Senafé was a corruption of the ancient Greek name. Abyssinia was full of places bearing corrupted Greek names. There was one point connected with physical geography which he might touch upon: it was with regard to the depression of the salt lakes. As long ago as Christmas-day, 1840, when travelling

between Tadjurra and Shoa, he examined Lake Assal, and estimated its depression below the sea-level at 760 feet. The salt-plain of northern Abyssinia had now been found to be in like manner below the sea-level. He had always held the opinion that this lake-basin was formerly an arm of the sea, which had been cut off by the land now intervening, and that the water had since evaporated, leaving the salt in a rough solid form. The water-parting of the Abyssinian table-land was very remarkable; for it lay along its eastern edge, not far from the Red Sea; so that near Halai, within view of this sea, the waters diverged, on one side flowing into the Mediterranean, by way of the Nile, and thence running into the Atlantic, and on the other side flowing into the Red Sea, which joins the Indian and Pacific Oceans. When travelling along this water-parting, further south, in company with his friend Dr. Krapf, he remembered throwing sticks into the streams running right and left as they went along, and saying that those sticks would never meet again, unless they went round the Cape of Good Hope or Cape Horn.

Sir SAMUEL BAKER said his personal experience of Abyssinia was confined to the north-western slopes of its table-lands, where he had spent many months, and had penetrated, in the course of his hunting excursions, into the ravines which occur every few miles in the chain of mountains. The description that had been given by Mr. Markham was most interesting to him. It was clear that in advancing southwards from Senafé our troops would have to cross every one of the tributaries of the Nile running from the watershed of Abyssinia. Up to the present time Mr. Markham had had but a short acquaintance with the country; but he would find, as he gained more experience, that our troops are in one of the finest countries in the world. He had himself discovered that the whole of the northern and western sides of this country, which had only been passed through in a direct line by Mr. Mansfield Parkyns, and by Bruce 90 years ago, might be made one of the finest cotton producing countries in the world. He found that, although far distant from the port of Suakim, which was the natural outlet (not Massowah), that the price of transport by camels was simply four shillings per cwt., or a little less than one halfpenny per pound. Therefore, although people in England might imagine the distance from our market would be too great for cotton to be grown profitably, he could assure them that if there were only a stable government established, the region in question would be one of the greatest cotton-growing countries in the world. Coming to Abyssinia proper, he had noticed the same geological structure in the north-west which Mr. Markham found at Senafé. It consisted of sand-stone lying upon schistous rock, but as he approached the mountains he found that basalt had forced its way apparently through the sandstone, and formed the elevated peaks of the great chain of mountains rising abruptly to a height of from 8000 to 12,000 feet. The face of the mountain range on the northern side formed a nearly perpendicular wall. The reason of this was obvious. After the heavy rainfalls, a tremendous rush of water poured down upon that side, which had entirely altered the form of that portion of the country. Instead of being a gradual ascent and descent, as it was on the other side, between Senafé and the sea-coast, it was found to be perfectly precipitous; the great floods had carried away the whole of the earth, and that earth now formed the delta of the Nile at Alexandria. With regard to the captives, the question now was, should we be able to reach Magdala before the rainy season set in? Up to the present time, taking into consideration the enormous difficulties of the country, there could not have been fewer mistakes made. But he felt perfectly convinced that it would be impossible for our army to reach Magdala and to finish the war before the rains. Few people could appreciate what these rains meant until they had seen an Abyssinian rainy season. When those rains began there was a total cessation of travelling; and with the young grass, unfortunately, a fatal cattle epidemic appeared. These were things which no general could combat against. If the captives should still be at Magdala whilst we

were at Adigrat, the difficulty would be this, that when the King found himself hemmed in by the advancing forces of Sir Robert Napier, he would most likely kill the captives, or retreat with them into the mountains, and hold them as hostages, so as to force Sir Robert Napier to agree to his own terms; or should Sir Robert Napier refuse to sign such an agreement, then the war would be carried on *ad infinitum*. Or supposing we caught Theodore, and obtained the release of the captives, the question would be, "What shall we do with Abyssinia?" It was proved to be a most healthy country, it was a cotton and coffee-growing country, it had good ports on the Red Sea, and it was on the high road to India. Most people dreaded annexations; but he had a firm conviction, that after having spent 10,000,000/, and having conquered Abyssinia, if we should retire from that country, the natives of India would say that we had been driven out: we should, therefore, lose our reputation, to preserve which had been the object of the war. He had, therefore, come to the conclusion that the English ought to remain where they were, and retain possession of the country.

The PRESIDENT remarked that Sir Samuel Baker, who in the earlier part of his observations had very effectively expatiated on the geographical features of North-western Abyssinia, had ultimately drifted into political questions which were well suited to the House of Commons, but wholly out of the province of this Society. He must recall his attention to matters of geography. He (the President) held in his hand a new map of Eastern Abyssinia, which he had received that morning from Dr. Petermann, of Gotha, and which contained all the geographical information obtained up to the present time by our expedition. It was a remarkable instance of rapid execution in cartography, the official map containing the new information having only been issued by the Topographical Department of our War Office a fortnight previously. Our own authorities and the public were much indebted to Colonel Cooke, of the Topographical Department, for the ability and promptitude with which he incorporated the new information into the official map of Abyssinia. He also held in his hand a series of most graphic sketches representing the features of the interior of Abyssinia, made by Mr. Essler, one of the captives who escaped. They now belonged to Bishop Gobat, and were about to be lithographed and published by Mr. Hotten of Piccadilly. He then called on Colonel Cooke to speak, and expressed a hope that, whoever might address the meeting, the speaker would confine himself to scientific matter.

Sir HENRY RAWLINSON said he was sorry Colonel Cooke was not present to give some of the results of his well-digested researches into Abyssinian geography. The Blue Book compiled by him was one of the most admirable digests that was ever put together. It must be invaluable to the officers engaged in the expedition. In alluding to this work he wished to draw attention not merely to the geography of the country which our troops had passed over, but also to the geography of the country through which they would advance. Before the British troops had landed on the coast they were able, owing to the information that Colonel Cooke had collected, to indicate the route the army would have to march along, at least so far as to point out, as he had the honour of doing in that room three months ago, that Senafé would probably be the first post, Adigrat the next, and Antalo the third. With regard to the geography of the country further southward, they were able with the help of this book to anticipate day by day pretty nearly what would happen to our troops almost the whole way to Magdala. He disagreed with Sir Samuel Baker as to some of the difficulties which he foreshadowed. In the first place, the troops would not cross any of the streams; they would keep along the eastern edge of the table-lands, so as really to go round the head-waters of the streams, and consequently avoid the precipitous ravines which furrowed the country. It was the route which Dr. Krapf followed on his journey. Dr. Beke travelled from Antalo to Sokoto, and had to cross the river valleys, and in so doing got into

more difficult country than he would have done if he had kept along the crest of the mountains. The most important point was, that the country between Adigrat and Antalo, which was the district about to be traversed by our troops, was really the easiest country in all Abyssinia. It consisted of a high plateau, and was so open that Lefebre and Krapf both mention that it was sometimes traversed by camels. It was important to know that we need not expect the same difficulties and the same delays that had occurred hitherto. The real difficulty and the real cause of delay was the ascent to the plateau from Annesley Bay. Once there, it was plain sailing all the way to Antalo. Nor was there any occasion for misgiving with regard to the rainy season. According to the accounts of all travellers, the rainy season need not stop operations in any way. The great Portuguese expedition took place during the rainy season, and the great battle which they fought with the Abyssinians was on the 15th of August, in the very midst of the rainy season. The prisoners had always stated that although there was rain for three or four months in the year, no unhealthiness accompanied the rain. But for the exception of getting a wet skin occasionally, there was no more inconvenience in marching in the rainy season than at any other time of the year. He should not follow Sir Samuel Baker into a discussion of the political part of the subject; but with regard to his "inevitable suggestion," he thought, looking at the point fairly and dispassionately, that there were stronger grounds against than in favour of annexation. We had given a pledge to the whole world that we did not contemplate territorial acquisition, and we were bound in honour and fairness to carry this out. At the same time he saw no valid objection to our retaining a footing on the coast, which did not belong to Abyssinia, not merely for purposes of commerce, but also of philanthropy, in view of the more effectual suppression of the slave-trade.

Sir STAFFORD NORTHCOTE said, after the two last speeches if he were to remain silent it might be supposed that he assented to the views they expressed. But he must be permitted to say that they did not represent the views of the Government. We had undertaken this expedition for one purpose, which was to rescue our fellow-men and our envoy from captivity; and when we had succeeded in that object our forces would be withdrawn, and no other consequences would follow.

Dr. BEKE wished to add, with respect to the rainy season, there was not a day during which there would not be several hours suitable for an army to march. Sir Henry Rawlinson had spoken quite truly in saying that the Portuguese campaign was carried on and their great battle fought during the rainy season; namely, on August 30th, 1542. In the year 1805, Mr. Salt left Arkiko, on the coast of the Red Sea, on July 18th, and arrived at Antalo, the Ras's residence, on August 18th. Thence he went to Adowa and Axum, returning to Antalo in time to be present, on September 26th, at a grand muster and review of the Ras's troops, who "had for several days past been assembling from all parts of that Prince's dominions;" and on October 10th he left Antalo on his return to the coast, which he reached in perfect health on November 7th. He believed the British army could march along the upper country every day of the year without exception.

Mr. CRAWFURD said he did not think the rainy season so dangerous and difficult as Sir Samuel Baker had represented. Moreover, the rainy season did not commence till June, consequently there were four months for the troops to march to Magdala, and they had already advanced one-fourth of the way. He was opposed to keeping possession of Abyssinia, and he could not agree with Sir Samuel Baker in thinking it could ever be made a cotton-producing country. The inhabitants of Abyssinia were barbarians, and no barbarians ever did produce cotton.